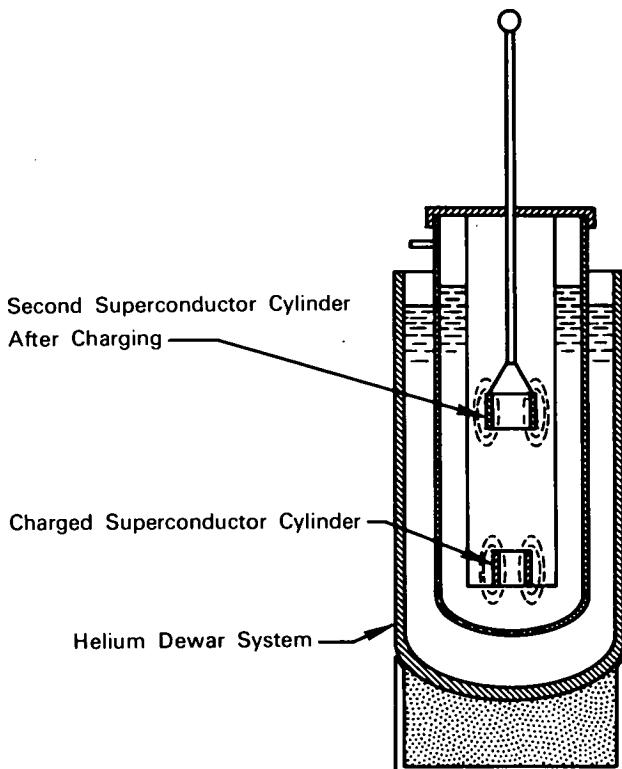


NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Supercold Technique Duplicates Magnetic Field in Second Superconductor



The problem: To generate a magnetic field in one or more superconductor tubes or cylinders without the necessity of building up a high magnetic field outside the cylinder with a magnetic coil.

The solution: A technique that causes a superconductor cylinder, already charged with a high magnetic field, to create a similar field in another superconductor cylinder.

How it's done: When a superconducting cylinder containing a high magnetic field is available in the supercool environment of a helium Dewar system, a simple technique can be used to create a field almost as large in a second superconductor cylinder. The second cylinder must be slightly larger so that it will slip over and around the charged one.

(continued overleaf)

The second cylinder must be first cooled to a temperature just above the point where it becomes superconducting. Cooling to this temperature is essential in order to prevent the uncharged cylinder from heating the first cylinder when the two are later brought into close proximity.

When the proper precooling temperature has been reached in the larger (second) cylinder and it is still in a nonsuperconducting state, it is lowered into the helium Dewar system and fitted around the cylinder with the existing magnetic field.

Now the larger cylinder is allowed to cool further until it becomes superconducting. Most of the magnetic flux lines will pass through and around the two cylinders. When the second cylinder is lifted upward, it will be found that it contains a magnetic field almost as large as the field trapped in the originally charged cylinder. Energy required for charging the second cylinder comes from the mechanical energy required to pull the two cylinders apart.

Notes:

1. More than one cylinder or superconductor tube can be charged by this technique with little effect on the original magnetic field of the superconductor tube. This charging process may be accomplished with superconducting material of any shape if the magnetic flux of the originally charged cylinder can be made to pass around the second piece when they are brought together.
2. Inquiries concerning this innovation may be directed to:

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Reference: B63-10237

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Alvin F. Hildebrandt
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